

Appl. No. 10/518,825
Amdt. dated Jan. 28, 2008
Reply to Office action of Oct. 30, 2007

Amendments to the Drawings:

The attached sheet of drawings includes a new Figure 5. In Figure 5, elements including an optical signal processing device comprising a source of electromagnetic radiation, a non-linear optical component and means of detecting electromagnetic radiation have been added.

Attachment: New Sheet

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REMARKS/ARGUMENTS

Reconsideration of the present application as amended is respectfully requested.

In the Office action the drawings were objected to as not illustrating the structure of the invention. This Amendment revises the specification and submits an additional drawing, Fig. 5, to correct this informality by presenting in schematic form the structure disclosed in Applicants specification at, for example, paragraphs [0011], [0017] and [0051]. Applicants respectfully request withdrawal of the drawings objection and approval of the enclosed, proposed drawing.

Claims 1-21 are in this application. Claims 13-21 are added by this Amendment.

By means of the present amendment, Claims 2-4 and 6-9 have been amended, without prejudice, for better conformance to U.S. practice, such as beginning the dependent claims with 'The' instead of 'A', and changing "characterized in that" to --wherein--. These amendments to Claims 2-4 and 6-

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9 were not made to address issues of patentability.

In the Office action, the Examiner rejected Claims 1-9 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,096,496 (*Frankel*) in view of U.S. Patent No. 7,129,554 (*Lieber et al.*).

In response, Claims 1 and 5 have been amended and new Claims 10-21 have been added to clarify Applicants' invention.

It is respectfully submitted that Claims 1-9 and new Claims 10-21 are patentable over *Frankel* and *Lieber* for at least the following reasons.

In the Office action, the Examiner cited *Frankel* at col. 23, lines 7-10 as disclosing a non-linear optical component. *Frankel* at col. 23, lines 7-10 discloses, however, only that surrounding each LED-microcavity combination is a scattering medium that enables the emitted light to radiate non-directionally. Applicants respectfully submit that *Frankel* discloses only a source of directionally scattered light (i.e. light that radiates in various directions rather than being projected linearly) and does

not disclose or suggest a variation in any light parameter other than direction. Moreover, no disclosure is made in *Frankel* of a nanotube or light emission from a nanotube. In stark contrast, amended Claims 1 and 5 and new Claim 17 recite a nanotube configured to emit light at wavelengths varying non-linearly with intensity of light, as set forth in, for example, Fig. 3 of Applicants' application.

The deficiency in *Frankel* as a reference against Applicants' invention as set forth in Claims 1 and 5 as well as new Claim 17, cannot be cured with reference to *Lieber*. *Lieber* discloses only that a semiconductor or metal nanoparticle ("quantum dot") may be constructed (for use in electrical devices comprised of nanoscopic wires) to receive electromagnetic radiation of one wavelength and emit electromagnetic radiation of a different wavelength (col. 17, lines 11-14 and col. 6, lines 21-24). No disclosure or suggestion is made of wavelengths varying or varying non-linearly as set forth in Claims 1, 5 and 17.

Accordingly, Applicants respectfully submit that neither *Frankel*, nor *Lieber*, alone or in combination, disclose or suggest the optical signal processing device

comprising a carbon nanotube configured to emit light at wavelengths varying non-linearly with light intensity recited in Claim 1 or the optical component having at least one photoluminescent carbon nanotube configured to emit light at wavelengths varying non-linearly with the intensity of said light recited in Claim 5 or the optical device comprising at least one photoluminescent carbon nanotube configured to emit, in response to an input of electromagnetic radiation, light over a range that includes wavelengths from 600 to 700 nm, the wavelengths varying non-linearly with intensity of the electromagnetic radiation recited in Claim 17 (and in Claim 16 from which Claim 17 depends).

New Claims 10-18 further recite patentable features of Applicants' invention as set forth in, for example, Fig. 3 and paragraphs [0013] and [0047] of Applicants' specification.

Neither *Frankel* nor *Lieber* show light of a range of wavelengths emitted from a carbon nanotube as recited in new Claims 10, 13 and 16 or a maximum value in the wavelength of

light emitted as recited in new Claims 11, 14, 15 and 18.

Frankel at col. 17, lines 53-67 (cited in the Office action as disclosing a scattering medium comprising a photoluminescent emitting structure), in particular, teaches away from the present invention as set forth in Claims 10, 13 and 16. *Frankel* at col. 17, lines 53-67 reads (emphasis added):

Man-made constructs are thus necessary to combine with the naturally emitting frequency shifting emissions to enable combination spectral coding. Presented herein are fluorescence, excitonic, and Raman system embodiments that are both properly narrow and strong. These system embodiments provide narrowing, and tuning of fluorescent spectra and enhancement of the efficiency of emission of specific spectral bands and Raman emissions.

The teaching of *Frankel* is thus limited to narrowing and specifying the emitted spectra, not to light emission over, for example, a range as recited in Claims 10, 13 and 16.

It would, moreover, not, in any event, be obvious to modify these references to provide for a range of wavelengths emitted from a carbon nanotube as recited in new

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Claims 10, 13 and 16 or a maximum value in the wavelength of light emitted as recited in new Claims 11, 14, 15 and 18, since neither reference recognizes the desirability of these features, and such desirability would not be recognized by one of ordinary skill in the art.

In addition, Applicants deny any statement, position or averment of the Examiner that is not specifically addressed by the foregoing argument and response. Any rejections and/or points of argument not addressed would appear to be moot in view of the presented remarks. Applicants reserve the right, however, to submit further arguments in support of the above stated position, should that become necessary. No arguments are waived and none of the Examiner's statements are conceded.

In view of the above, it is respectfully submitted that Claims 1, 5. and 10-18 are patentable that Claims 2-4, 6-9 and 19-21 are patentable at least base upon their respective dependencies and that the present application is in condition for allowance. A Notice of Allowance is earnestly

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solicited.

If any informalities remain, the Examiner is requested to telephone the undersigned in order to expedite allowance.

Please charge any fee deficiencies and credit any overpayments to Deposit Account No. 14-1270.

Respectfully submitted,

By Frank Keegan
Frank Keegan, Reg. 50,145
Attorney
(914) 333-9669
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Attachment